

System Wide Information Management (SWIM)

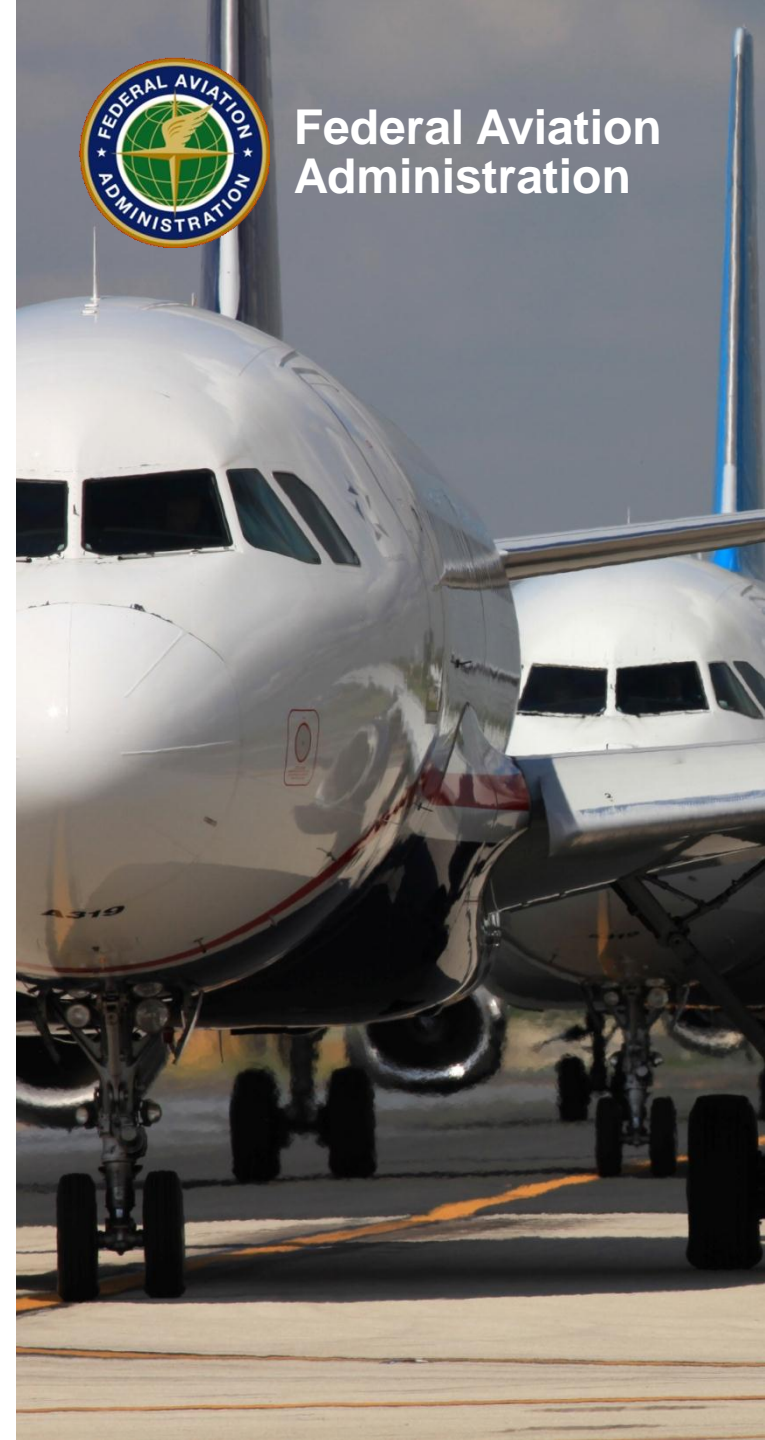
Program Overview and Status Update

Presented by: Jim Robb
SWIM Program Manager

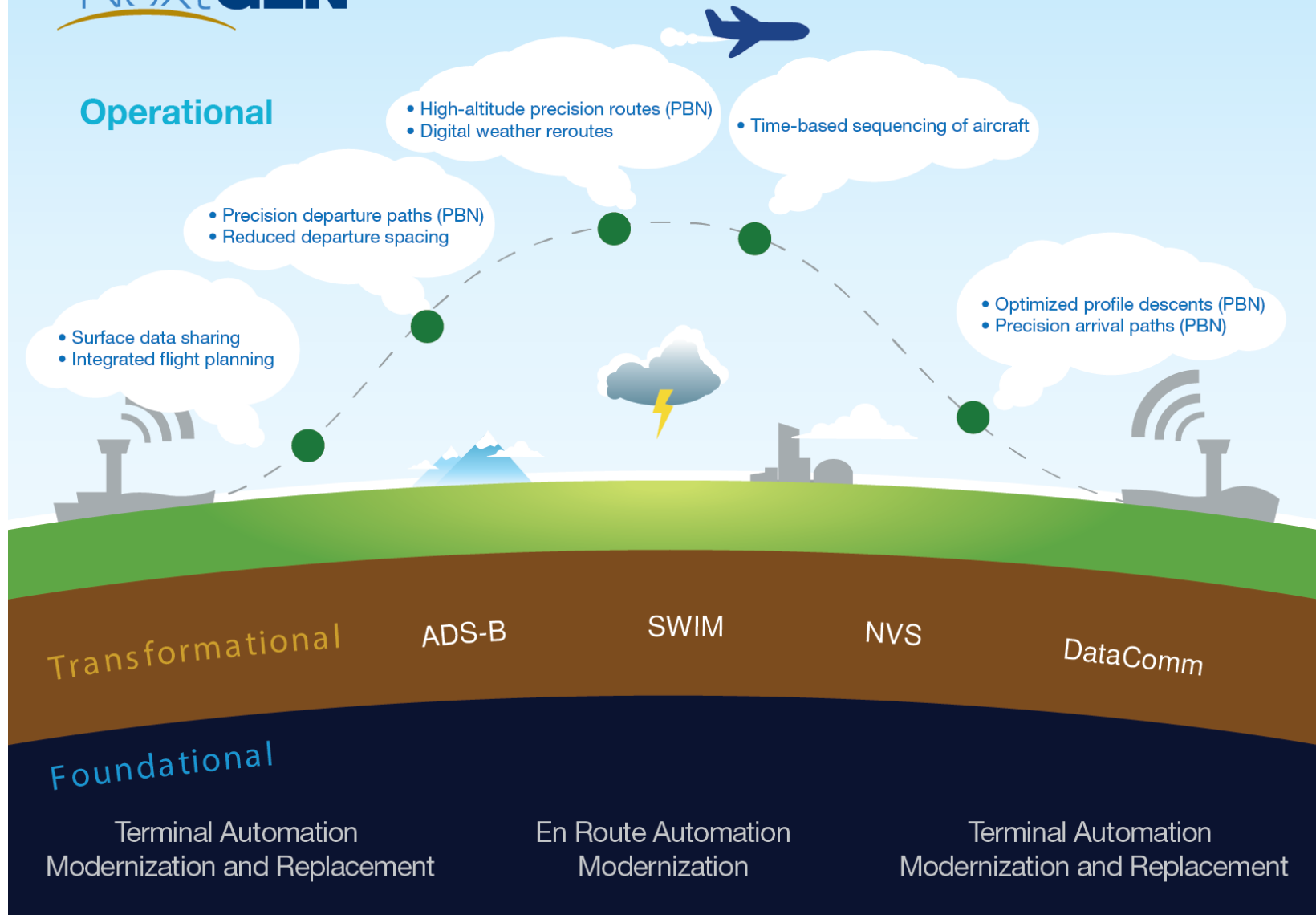
Date: April 24, 2014



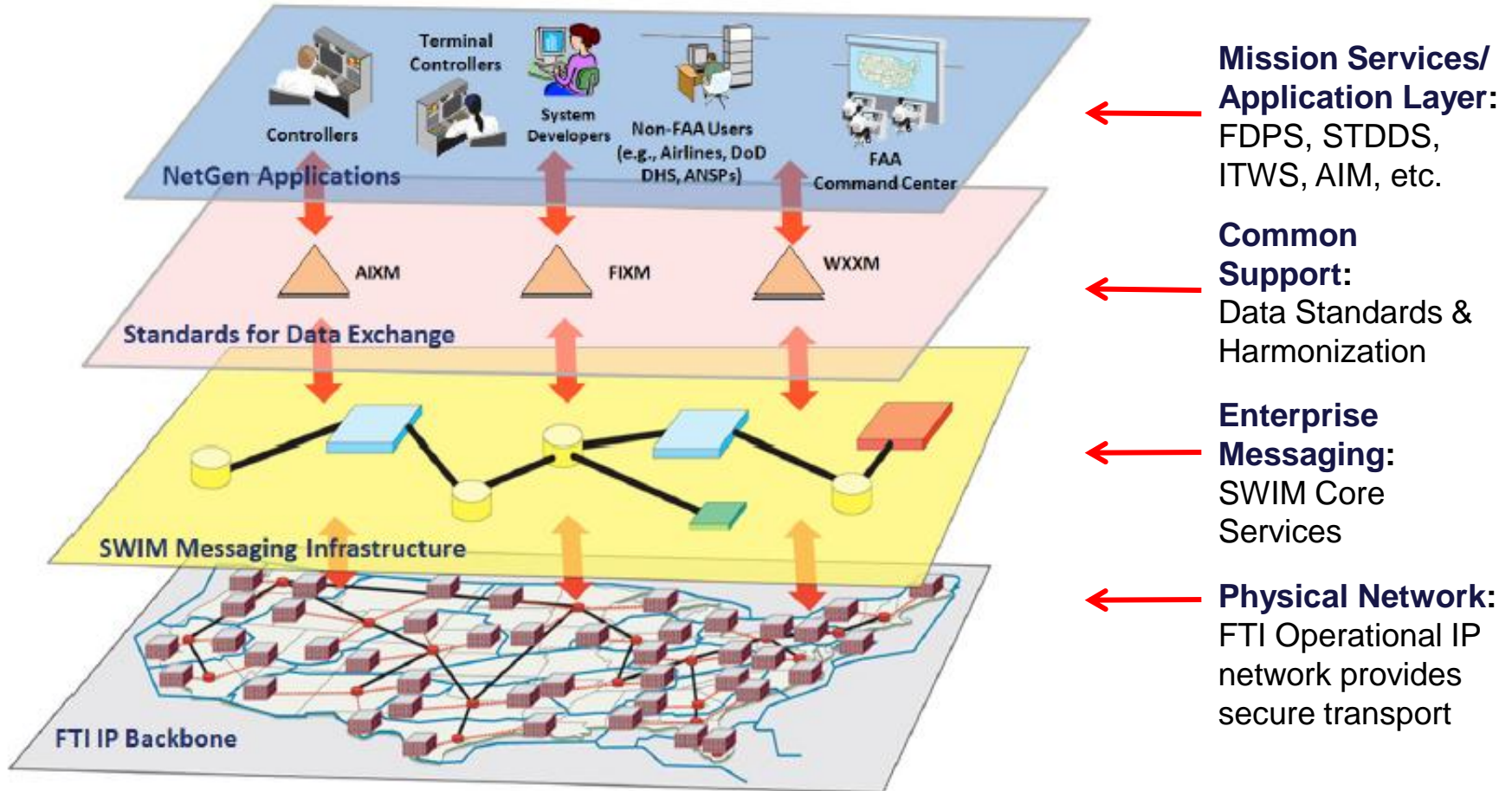
Federal Aviation
Administration



Operational

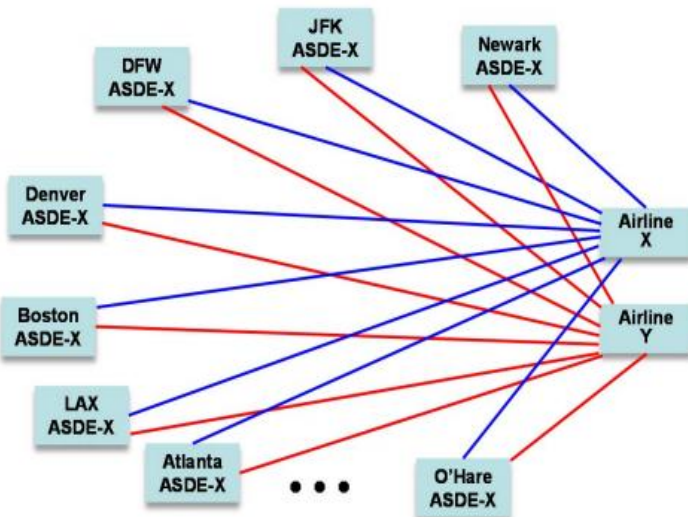


NextGen Information Sharing Architecture

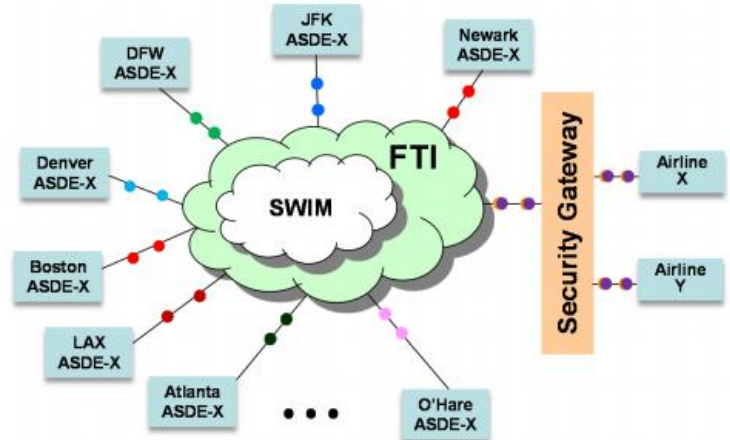


SWIM Benefits

- Replaces unique interfaces with modern standards-based data exchange
- Provides SWIM users access to information without directly connecting to another system
- Provides enterprise security for incoming and outgoing data



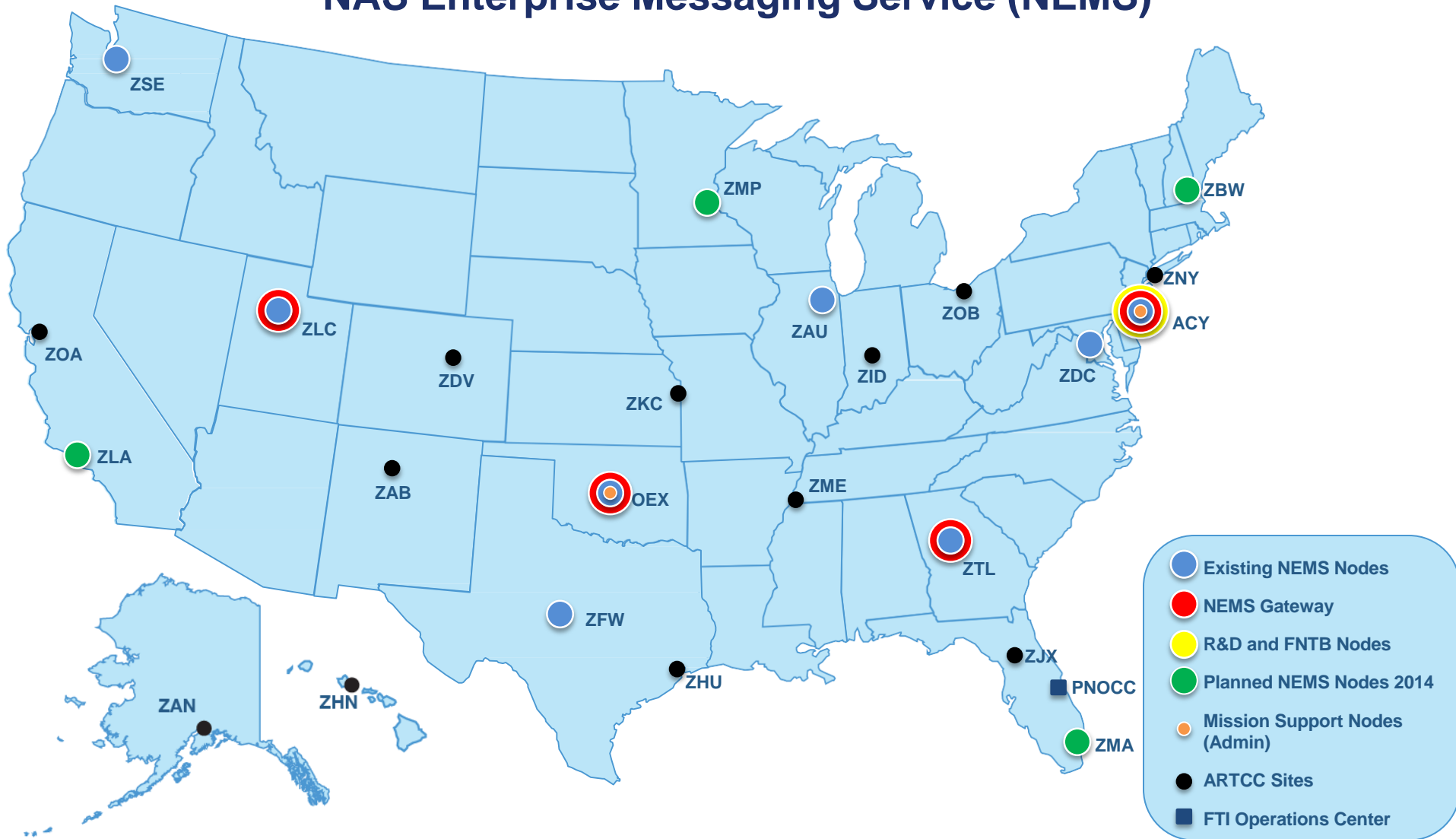
Legacy operating environment:
Point-to-point connections



SWIM operating environment:
Data Exchange
(Published once, consumed by many)

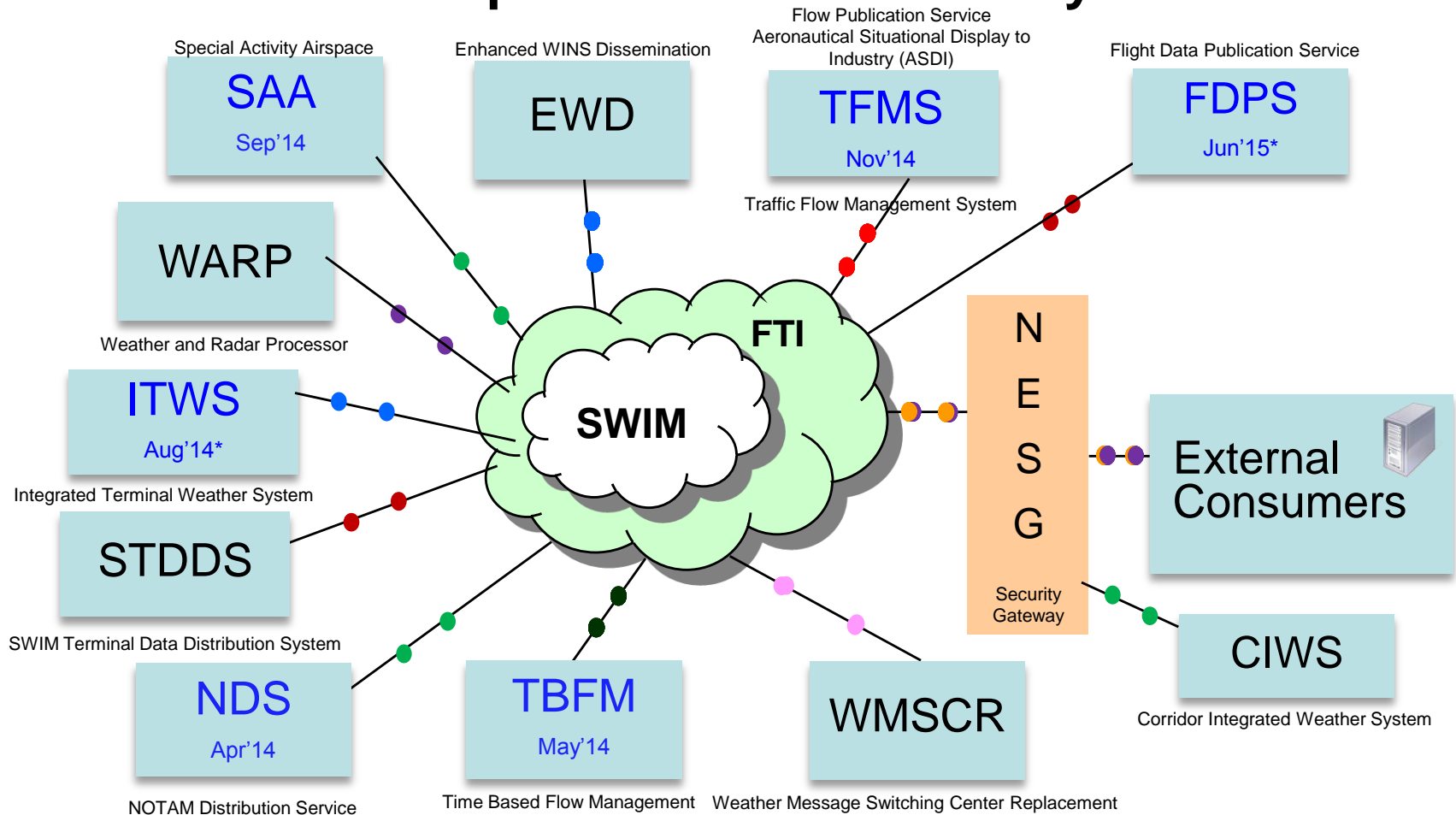
SWIM Infrastructure Deployment

NAS Enterprise Messaging Service (NEMS)

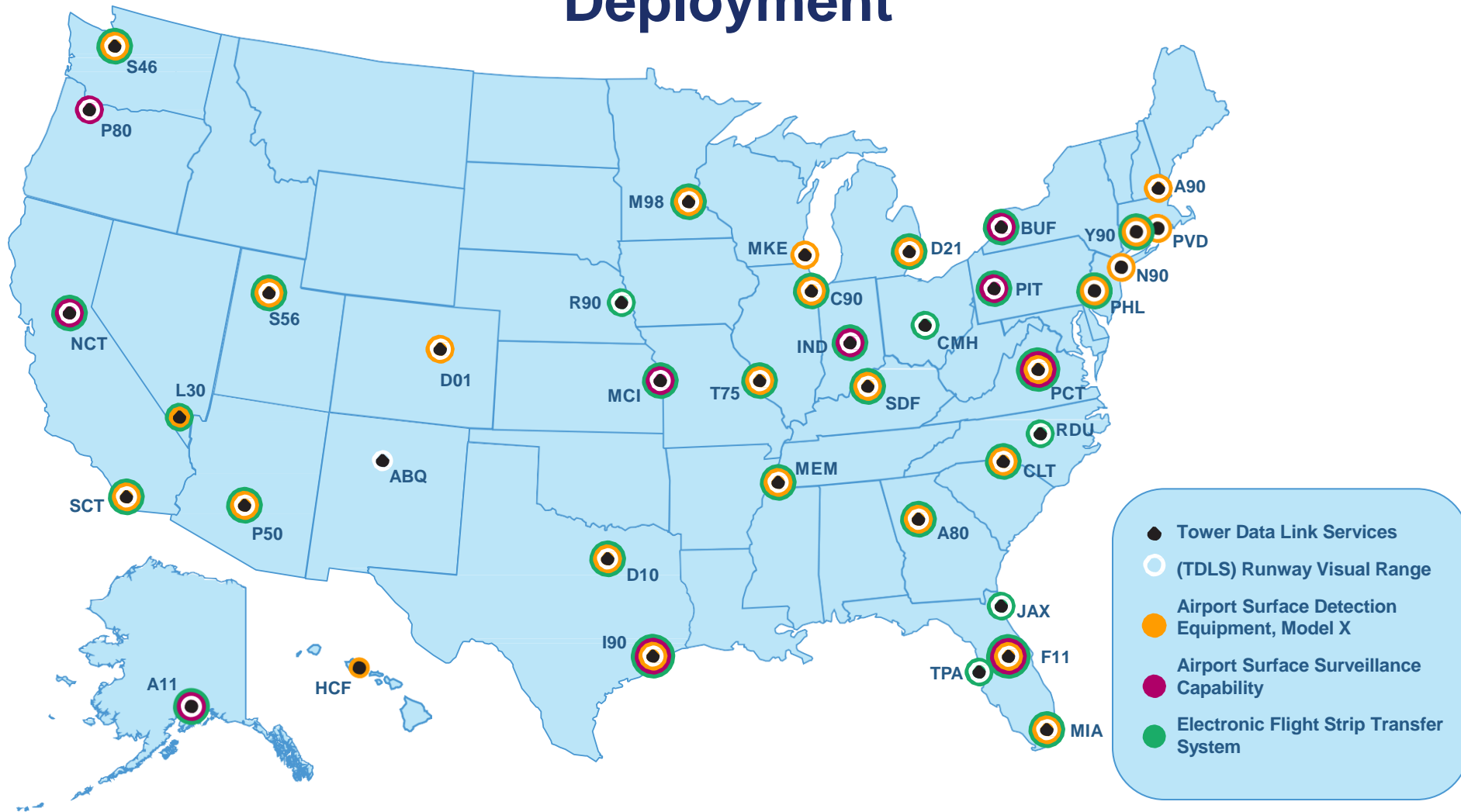


SWIM Data Exchange – Participating Programs

The following FAA systems publish products on the SWIM/NEMS enterprise service bus today



SWIM Terminal Data Distribution Service Deployment



SWIM Terminal Data Distribution System (STDDS)

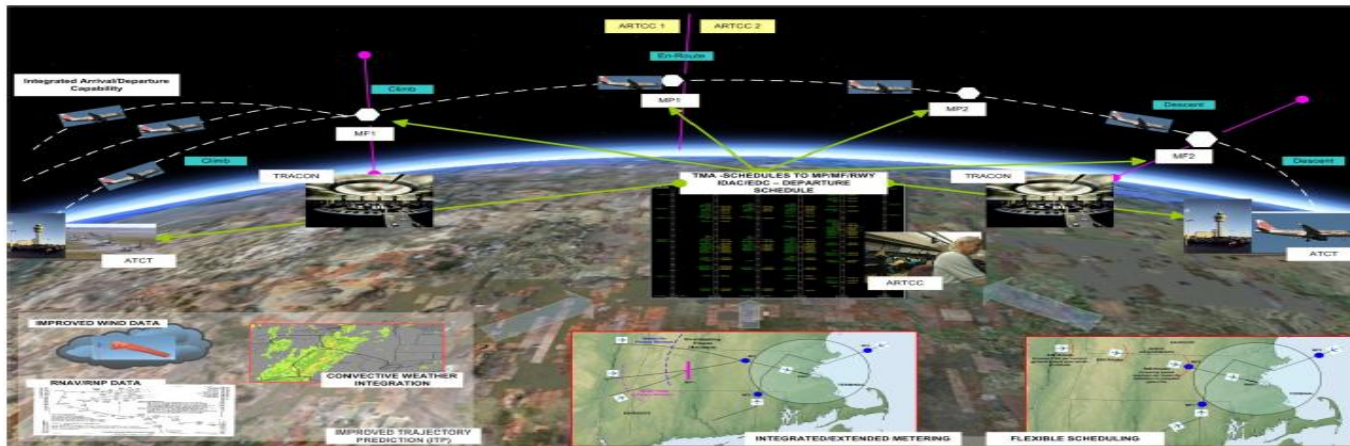
JMS Publish/Subscribe connection of XML data (Airport Surface Detection Equipment-Model X (ASDE-X), Airport Surface Surveillance Capability (ASSC), Electronic Flight Strip Transfer System (EFSTS), Tower Data Link Services (TDLS), and Runway Visual Range (RVR))

- **ASDE-X and ASSC**
 - Event date/time for each flight:
 - Spot Out (departure aircraft crosses from ramp to surface movement area)
 - Spot In (arrival aircraft crosses from surface movement area to ramp)
 - Off (wheels up)
 - On (wheels down)
 - Category 11 data and Generic Flight Plan data
- **Tower Departure Event Data**
 - Aircraft parking gate and Departure runway
 - Clearance delivery time (date/time at which clearance was issued)
 - Taxi start time (date/time at which taxi start was issued)
 - Takeoff time (date/time at which takeoff clearance was issued)
- **RVR Data**
 - Visual range in hundreds of feet at touchdown, midpoint, and rollout
 - Visibility trend (steady, increasing, decreasing) at touchdown/midpoint/rollout
 - Runway edge light and center light setting intensity from 0 (off) to 5 (maximum)

Time-Based Flow Management (TBFM) Information Sharing Service

TBFM optimizes the flow of aircraft into busy airspace. It was installed in all 20 En Route centers in July 2013 to meter aircraft through all phases of flight in order to deliver the correct number of aircraft to airspace sectors and down to the runway at the exact pace at which the aircraft can be accommodated.

JMS Publish/Subscribe connection of XML data to TBFM's Information Sharing provides this metering information.



Enhanced Weather Information Network Service (WINS) Dissemination (EWD)

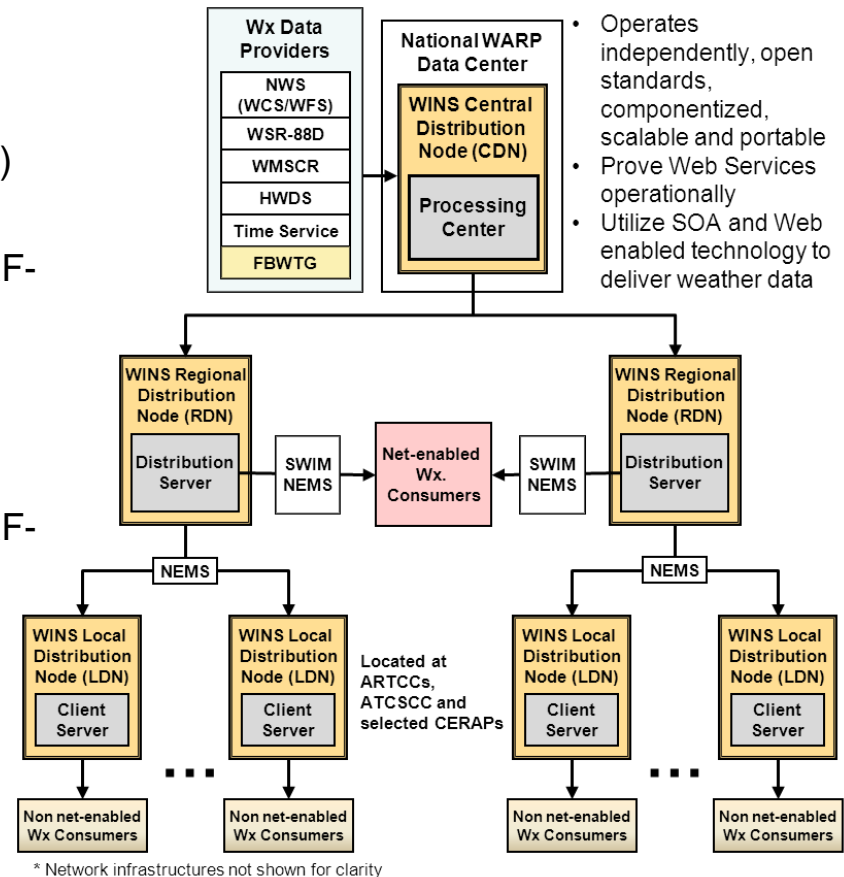
Web Service and JMS Publish/Subscribe connection to XML and binary data on adverse weather, forecasts and other meteorological advisories.

Current products:

- Harris Weather Data Service (HWDS)
- Weather Surveillance Radar – 1988 Doppler (WSR-88D)
- Aviation Routine Weather Report (METAR)
- Weather Research and Forecasting-Rapid Refresh (WRF-RR) 40km Resolution Model Data
- North American Mesoscale (NAM) Model Data
- Global Forecast System (GFS) Model Data

Planned products:

- Weather Research and Forecasting-Rapid Refresh (WRF-RR) 13km Resolution Model Data
- Current Icing Product (CIP)
- National Convective Weather Forecast (NCWF)
- National Convective Weather Diagnostic (NCWD)
- Significant Meteorological Information (SIGMET)
- Collaborative Convective Forecast Product (CCFP)
- Airmen's Meteorological Information (AIRMET)



Integrated Terminal Weather System (ITWS)

Publication of XML data (weather data products available to TRACONs and Tower Controllers) using SWIM compliant JMS Publish/Subscribe capabilities

ITWS provides data to consumers externally via SWIM in Industry Standard XML format

ITWS processing capability will be subsumed by NextGen Weather Processor (NWP) in 2017 timeframe

ITWS publishing capability will be subsumed by Common Support Services – Weather (CSS-Wx) in OGC formats in 2017 timeframe

Terminal Areas with ITWS:

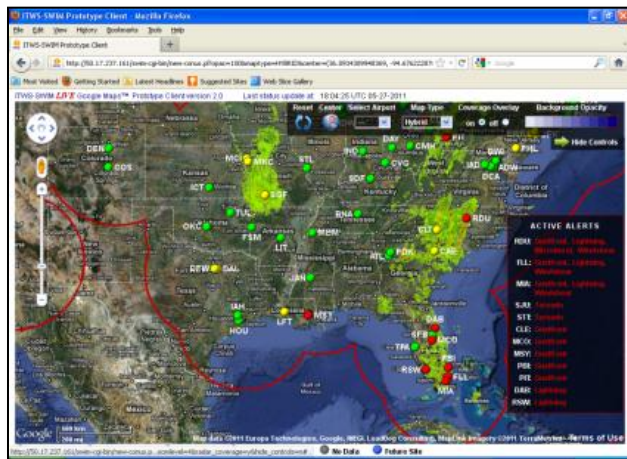
Miami, ASO (MIA)	Dallas/Fort Worth MCF ASW (D10)	New Orleans, ASW (MSY)
Kansas City, ACE (MCI)	Orlando, ASO (MCO)	Las Vegas, AWP (LAS)
St. Louis, ACE (T75)	Memphis, ASO (MEM)	Nashville, ASO (BNA)
Houston, ASW (I90)	Detroit/Wayne, AGL (DTW)	Indianapolis, AGL (IND)
Chicago MCF, AGL (C90)	Cincinnati, ASO (CVG)	Oklahoma City, ASW (OKC)
Potomac, AEA (PCT)	Pittsburgh, AEA (PIT)	Wichita, ACE (ICT)
Boston, ANE (F90)	Phoenix, AWP (P50)	Louisville, ASO (SDF)
Minneapolis/St. Paul, AGL (M98)	Philadelphia, AEA (PHL)	Columbus, AGL (CMH)
Charlotte, ASO (CLT)	Salt Lake City, ANM (S56)	Atlanta, ASO (ATL)
Denver MCF, ANM (D01)	Cleveland, AGL (CLE)	Raleigh-Durham, ASO (RDU)
New York, AEA (N90)	Tulsa, ASW (TUL)	San Juan, ASO (SJU)
		Northern Cal, AWP (NCT)

ITWS Data Products:

Airport Lightning Warning
Configured Alerts
Forecast Accuracy
Forecast Contour
Forecast Image
Gust Front TRACON Map
Microburst TRACON Map
Precipitation 5nm
Precipitation Long Range
Precipitation TRACON

Storm Motion (SM) Storm Extrapolated
Positions (SEP) 5nm
SM SEP Long Range
SM SEP TRACON
Terminal Weather Text Normal
Tornado Alert
Tornado Detections Wind Profile
Anomalous Propagation (AP) Indicated
Precipitation
AP Status
Gust Front Estimated Time to Impact

Hazard Text 5nm
Hazard Text Long Range
Hazard Text TRACON
ITWS Status Information
Microburst Automatic Terminal
Information Service (ATIS)
Runway Configuration
Storm Motion 5NM
Storm Motion TRACON
Terminal Weather Text Special
Wind Shear ATIS

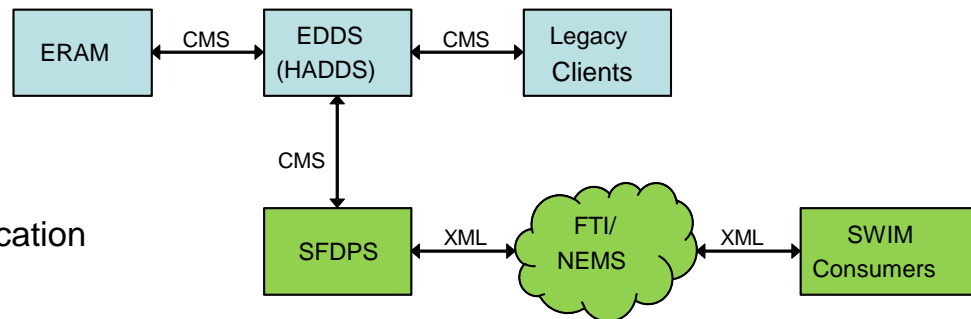


SWIM Flight Data Publication Service (SFDPS)

Phase 1 - operational in 2015 – flight data, airspace data, operational data, and general information messages

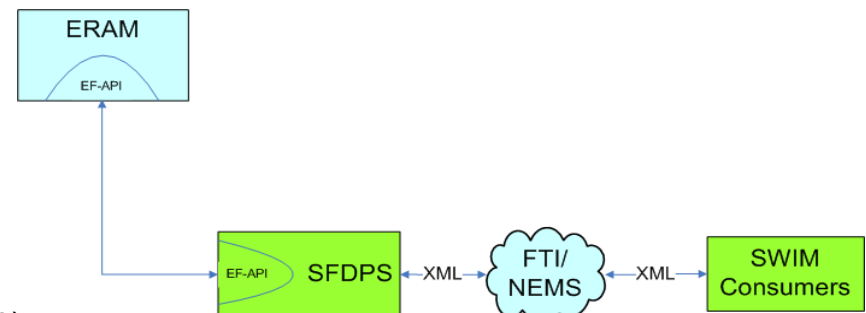
SFDPS Phase 1 Services include the following:

- En Route Flight Data Publication
- En Route Airspace Data Publication
- En Route Operational Data Publication
- En Route General Information Message Publication



SFDPS Phase 2 Services include the following:

- Flow Management Service
- Flight Strip/ FDIO Messaging Service
- Terminal Flight Data Manager (TFDM) Service
- Pre Departure Reroute (PDRR) Processing
- Airborne Reroute (ABRR) Processing
- Flight Data Service in FIXM standard (V2.0 & V3.0)
- Other services in XML V1.0 fifth edition



Corridor Integrated Weather System (CIWS) – Data Distribution Service (CDDS)

Web Service and JMS Publish/Subscribe connection to XML data (three-dimensional weather tracking system that focuses on high-volume “corridors” representing the combination of specific en route and terminal airspaces throughout the NAS)

CIWS will be subsumed by NWP in the 2017 time frame

CDDS will be subsumed by CSS-Wx in 2017 time frame

CIWS Products

Vertically Integrated Liquid (VIL) Mosaic (1km resolution)

VIL 2-hr. Forecast

Echo Tops Mosaic (1 km resolution)

Echo Tops 2-hr. Forecast

Satellite Mosaic

Storm Info: Echo Top Tags

Storm Info: Leading Edges

Storm Info: Motion Vectors

VIL Forecast Contours (Std. Mode)

VIL Forecast Contours (Winter Mode)

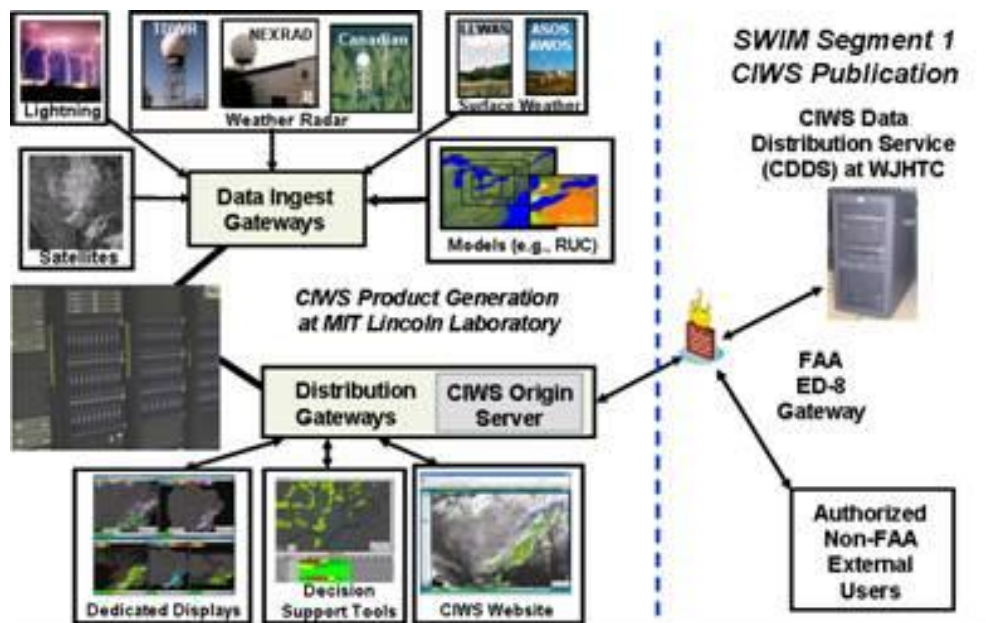
Echo Tops Forecast Contours

Growth & Decay Contours

Forecast Accuracy: Echo Tops

Forecast Accuracy: Std. Precip

Forecast Accuracy: Winter Precip

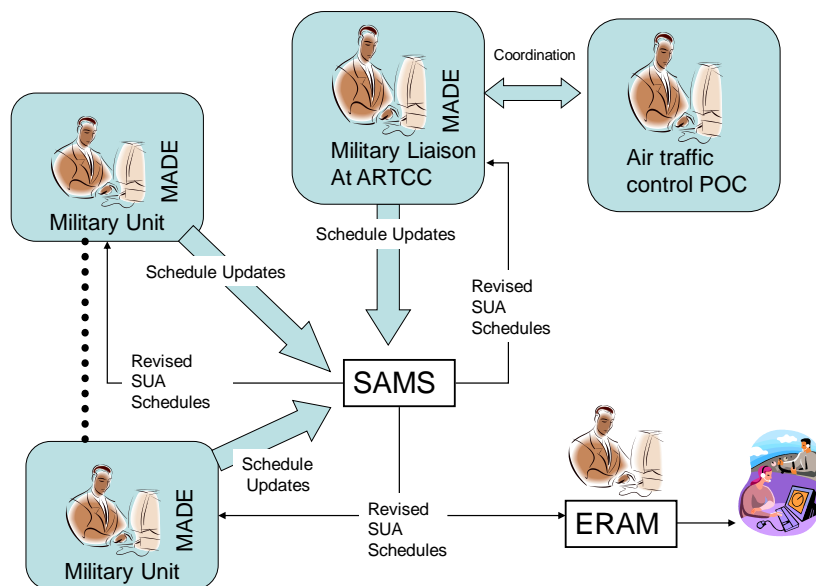


Aeronautical Information Management (AIM) Special Use Airspace (SUA) Automated Data Exchange

SUA is an area designated for operations such that limitations may be imposed on aircraft not participating in those operations.

AIM SUA Automated Data Exchange improves civilian access to current SUA schedules, and changes in SUA scheduling are captured and distributed as they are made.

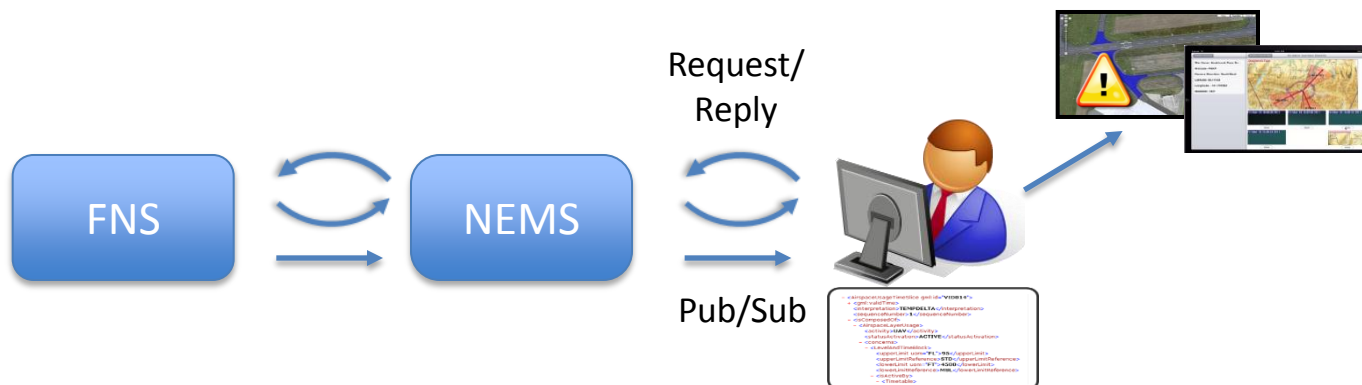
AIM Modernization improves SAA capabilities and includes Temporary Flight Restrictions, Altitude Reservations, and Military Training Routes and integrating SAA/SUA data with Notices to Airmen and airport data.



Federal NOTAM System – NOTAM Distribution Service Overview

Provides distribution of Notices to Airmen (NOTAMs)

- **Data feed that uses OGC WFS web-services**
 - Enables graphical NOTAM representation
- **Standards:** Aeronautical Information Exchange Model (AIXM) 5.1 format
- **ALL or Some:** Query and select types of data
- **External Market:** Enables 3rd party app development
- **Standards:** Include info needed for fusing data



Traffic Flow Management System (TFMS): TFMData Service

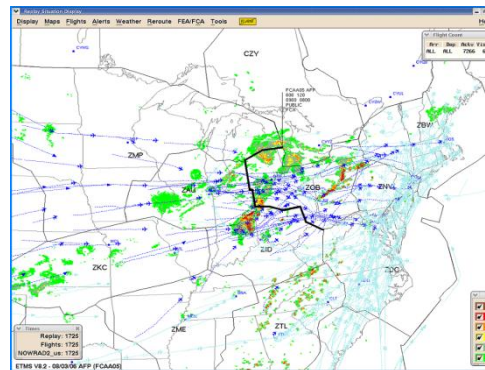
TFMS TFMData Service describes current and planned traffic flow initiatives in the NAS. This service will provide a means for information consumers to subscribe to traffic management data consisting of both Flight Data and Flow Information associated with the Traffic Flow Management domain.

Products include the following:

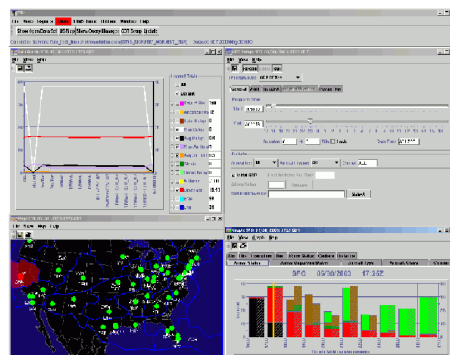
- Flow Constrained Area (FCA) / Flow Evaluation Area (FEA)
- Ground Delay Program (GDP) / Unified Delay Program (UDP)
- Airspace Flow Program (AFP)
- Collaborative Trajectory Options Program (CTOP)
- Route Availability Planning Tool (RAPT) time-line data
- ATCCSCC Advisories
- Ground Stop (GS)
- Reroutes
- Airport runway config and rates
- Airport deicing
- Restrictions



Denver Reroute



Airspace Flow Program (AFP)



FSM Ground Delay Tools components

SWIM Product Portfolio

SWIM Products

AIM SUA Data Exchange* Provides notification and status regarding airspace	SUA data, dynamically provided in the Aeronautical Information Exchange Model (AIXM) standard	AIXM SUA definitions	
ITWS Data Publication* Provides specialized weather products in the terminal area	Airport Lightning Warning Configured Alerts Forecast Accuracy Forecast Contour Forecast Image Gust Front TRACON Map Microburst TRACON Map Precipitation 5nm Precipitation Long Range Precipitation TRACON	Storm Motion (SM) Storm Extrapolated Positions (SEP) 5nm SM SEP Long Range SM SEP TRACON Terminal Weather Text Normal Tornado Alert Tornado Detections Wind Profile Anomalous Propagation (AP) Indicated Precipitation AP Status Gust Front Estimated Time to Impact	Hazard Text 5nm Hazard Text Long Range Hazard Text TRACON ITWS Status Information Microburst Automatic Terminal Information Service (ATIS) Runway Configuration Storm Motion 5NM Storm Motion TRACON Terminal Weather Text Special Wind Shear ATIS
CIWS Data Publication* Provides specialized 3D storm related weather information in the Enroute area	Vertically Integrated Liquid (VIL) Mosaic (1km resolution) VIL 2-hr. Forecast Echo Tops Mosaic (1 km resolution) Echo Tops 2-hr. Forecast Satellite Mosaic	Storm Info: Echo Top Tags Storm Info: Leading Edges Storm Info: Motion Vectors VIL Forecast Contours (Std. Mode) VIL Forecast Contours (Winter Mode)	Echo Tops Forecast Contours Growth & Decay Contours Forecast Accuracy: Echo Tops Forecast Accuracy: Std. Precip Forecast Accuracy: Winter Precip
WMSCR Publications Provides NWS textual aviation weather products	Transmission of voice PIREPs to WMSCR	Stored PIREPs	Altimeter settings
STDDS* Collects and publishes data from 100+ airports	ASDE-X streaming data service and Runway visibility data	Surface Movement Events (SME) RVR Data	Tower Departure Events (TDE)

***Service in development and on-ramping process**

SWIM Product Portfolio (cont.)

Enhanced WINS	Current Icing Product (CIP) Weather Research and Forecasting-Rapid Refresh (WRF-RR) Model Data North American Mesoscale (NAM) Model Data Global Forecast System (GFS) Model Data Airmen's Meteorological Information (AIRMET)	National Convective Weather Forecast (NCWF) National Convective Weather Diagnostic (NCWD) Aviation Routine Weather Report (METAR) Significant Meteorological Information (SIGMET) Collaborative Convective Forecast Product (CCFP)
	Harris Weather Data Service Product Set (HWDS) WARP Maintenance and Sustainment Services (WMSS)	Next Generation Weather Radar (NEXRAD)
NOTAM Distribution Service*	Digital NOTAMS AIXM 5.1	
Time Based Flow Management (TBFM) Information Service*	TBFM Information Service	Provides metering information about an aircraft: flight plan (relevant subset), Scheduled Time of Arrival (STAs), Estimated Time of Arrival (ETAs), Meter Reference Elements (MREs) Assignments, airport configuration information, per TRACON, satellite airport configurations, etc.
TFMS Flow Information Publication*	Flow Constrained Area (FCA) Airspace Flow Program (AFP) Aeronautical Situational Display to Industry (ASDI)	Ground Delay Program (GDP) Reroutes Ground Stops (GSs) Advisories
Flight Data Publication*	Flight Data Publication Service - Flight Plan information, Flight Amendment Information, Converted Route Information, Cancellation Information, Departure Information, Aircraft Identification Amendment information, Hold Information, Progress Report Information, Flight Arrival Information, Flight Plan Update Information, Expected Departure Time information, Position Update Information, Tentative flight Plan Information, Tentative Aircraft identification Amendment information, Tentative flight Plan Removal, Tentative Flight Plan Amendment Information, Track Information, Drop Track Information, Interim altitude information, Automated Radar Terminal System (ARTS) Flow control Track/Full Data block Information2, Beacon Code Reassignment, Beacon Code Restricted, Flight Plan Data Bank (FDB) Fourth Line Information, Point Out Information, Inbound Point Out Information, Handoff Status. Airspace Data Publication Service - Sector Assignment Status, Route Status, Special Activities Airspace (SAA), Altimeter Setting Operational Data Publication Service - Traffic count Adjustment, Instrument Approach Count Adjustment, Sign In Sign Out, Beacon Code Utilization, Geographic Beacon Code Utilization General Information Message Publication Service - General Information	

*Service in development and on-ramping process



SWIM Service Planning

Program	Discovery	Architecture, Requirements	Qualification (Data Arch, Design, HSV test)	Operations Rollout / Cutover
Terminal Automation Modernization and Replacement (TAMR)	In Progress	In Progress	TBD	Sep'15
Data Comm Network Services (DCNS) Monitoring Service	In Progress	In Progress	TBD	2015
NAS Information Display System (NIDS) Consumer	In Progress	In Progress	TBD	2015
Aeronautical Information Management (AIM) Segment 2	In Progress	In Progress	TBD	2015+
Common Support Services – Weather (CSS-Wx)	In Progress	In Progress	TBD	2015+
Terminal Flight Data Manager (TFDM)	In Progress	In Progress	TBD	2015-16

Summary of Current SWIM Consumers

Consumer	Data Type / Subscription
American Airlines	ASDE-X / LGA, BOS, MIA
Alliance	ASDE-X / MEM, ATL, JFK
ARINC	CIWS / all products
Atlanta Airport Authority	ASDE-X / all airports
CIWS	WMSS NEXRAD /all radar sites
CRCT	ASDE-X / LGA, EWR, JFK
Delta Airlines	ASDE-X / LGA
Fedex	ASDE-X / MEM
JetBlue	ASDE-X /all airports
Kent State	CIWS / all products
MIT - Lincoln Labs	ASDE-X / all airports, WMSS NEXRAD
Lockheed Martin	ASDE-X/ ATL, CLT, MSP, DTW, BOS, IAD, LAS

Consumer	Data Type / Subscription
MITRE	ASDE-X / all airports
MOSAIC ATM	ASDE-X / LGA, JFK, BOS, ATL, PHL, EWR, ORD, IAD, CLT; ITWS / all products
OASIS	HWDS / all products
Passur	ASDE-X / all airports / STDDS
Rockwell Collins	CIWS / all products
Sabre	ASDE-X / all airports; ITWS / all products
Sensis	ASDE-X / ATL, JFK
United Airlines	ASDE-X / all airports
USAIR	ASDE-X / PHX, DCA
Veracity	ASDE-X / LGA
Volpe	ASDE-X / all airports
WARP	Enhanced WINS

How to become a user of SWIM services

- **Two things are needed:**
 - Establishing an IP service connection to an FAA network security gateway; and
 - Ensuring your application follows the FAA's governance policies and standards for producing/consuming SWIM data products
- **Getting started...**
 - Email your request to:
9-AJM-312-EnterpriseEngineeringServices@faa.gov
 - Contact Andy Isaksen, FAA Manager
 - Enterprise Infrastructure Services Team, AJM-312
 - Phone: 609-485-4296 (desk), e-mail: Andy.Isaksen@faa.gov
 - Take advantage of FAA-published user documentation
 - Listed on the next slide →

FAA Documents Available to SWIM Consumers*

- **FTI OPIP User Guide (for External Connections)**
- **SWIM User Guide**
- **SWIM Jump-start Kit**

*These documents can be requested from Andy Isaksen, plan is to make them available on the NextGen website



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email: andy.isaksen@faa.gov



SWIM Related Acronyms

ABRR: Airborne Reroute

ADS-B: Automatic Dependent Surveillance-Broadcast

AFP: Airspace Flow Program

AIM: Aeronautical Information Management

AIRMET: Airmen's Meteorological Information

AIXM: Aeronautical Information Exchange Model

ANSP: Air Navigation Service Provider

AP: Anomalous Propagation

ARTCC: Air Route Traffic Control Centers

ARTS: Automated Radar Terminal System

ASDE-X: Airport Surface Detection Equipment-Model X

ASDI: Aeronautical Situational Display to Industry

ASSC: Airport Surface Surveillance Capability

ATIS: Automatic Terminal Information Service

CCFP: Collaborative Convective Forecast Product

CDDS: CIWS Data Distribution Service

CIP: Current Icing Product

CIWS: Corridor Integrated Weather System

CMS: Common Message Set

CSS-Wx: Common Support Services – Weather

DCNS: Data Comm Network Services

DHS: Department of Homeland Security

DoD: Department of Defense

EDDS: En Route Data Distribution Service

EFSTS: Electronic Flight Strip Transfer System

ERAM: En Route Automation Modernization

ETAs: Estimated Time of Arrival

FCA: Flow Constrained Area

FDB: Flight Plan Data Bank

FDIO: Flight Data Input / Output

FTI: FAA Telecommunications Infrastructure

GDP: Ground Delay Program

GFS: Global Forecast System

GSs: Ground Stops

HADDs: Host ATM (Air Traffic Management) Data Distribution System

HWDS: Harris Weather Data Service

ITWS: Integrated Terminal Weather Service

IP: Internet Protocol

JMS: Java Message Service

SWIM Related Acronyms (cont.)

METAR: Aviation Routine Weather Report

MREs: Meter Reference Elements

NAM: North American Mesoscale

NCWD: National Convective Weather Diagnostic

NCWF: National Convective Weather Forecast

NDS: NOTAM Distribution Service

NEMS: NAS Enterprise Messaging Service

NESG: NAS Enterprise Security Gateway

NEXRAD: Next Generation Weather Radar

NIDS: NAS Information Display System

NOTAMs: Notices to Airmen

NVS: NAS Voice System

NWP: NextGen Weather Processor

OGC: Open Geospatial Consortium

PDRR: Pre Departure Reroute

PIREP: Pilot report

RVR: Runway Visual Range

SAA: Special Activities Airspace

SEP: Storm Extrapolated Positions

SFDPS: SWIM Flight Data Publication Service

SIGMET: Significant Meteorological Information

SM: Storm Motion

SME: Surface Movement Events

STAs: Scheduled Time of Arrival

STDDS: SWIM Terminal Data Distribution System

SUA: Special Use Airspace

TAMR: Terminal Automation Modernization and Replacement

TDE: Tower Departure Events

TBFM: Time-Based Flow Management

TDLS: Tower Data Link Services

TFDM: Terminal Flight Data Manager

TFMS: Traffic Flow Management System

VIL: Vertically Integrated Liquid

WARP: Weather and Radar Processor

WFS: Web Feature Service

WMSCR: Weather Message Switching Center Replacement

WMSS: WARP Maintenance and Sustainment Services

WRF-RR: Weather Research and Forecasting-Rapid Refresh

WSR-88D: Weather Surveillance Radar – 1988 Doppler

XML: Extensible Markup Language